



This NASA image of Jupiter with its satellite Io was taken by the Cassini spacecraft. (Credit: NASA/Cassini Imaging Team). The satellite is 3,600 kilometers in diameter.

The scale of an image is found by measuring with a ruler the distance between two points on the image whose separation in physical units you know. In this case, we are told the diameter of Io is 3,600 kilometers.

Step 1: Measure the diameter of Io with a metric ruler. How many millimeters in diameter?

Step 2: Use clues in the image description to determine a physical distance or length.

Step 3: Divide your answer to Step 2 by your answer to Step 1 to get the image scale in kilometers per millimeter.

Once you know the image scale, you can measure the size of any feature in the image in units of millimeters. Then multiply it by the image scale from Step 3 to get the actual size of the feature in kilometers.

Question 1: What are the dimensions, in kilometers, of this image?

Question 2: What is the width, in kilometers, of the largest feature in the atmosphere of Jupiter?

Question 3: What is the width, in kilometers, of the smallest feature in the atmosphere of Jupiter?

Question 4: What is the size of the smallest feature on Io you can see?

Question 5: Why do the surface details of Io look different from the details on Jupiter?

Answer Key:

This NASA image of Jupiter with its satellite Io was taken by the Cassini spacecraft. (Credit: NASA/Cassini Imaging Team). The satellite is 3,600 kilometers in diameter.

The scale of an image is found by measuring with a ruler the distance between two points on the image whose separation in physical units you know. In this case, we are told the diameter of Io is 3,600 kilometers.

Step 1: Measure the diameter of Io with a metric ruler. How many millimeters in diameter?

Answer: 10 mm

Step 2: Use clues in the image description to determine a physical distance or length.

Answer: 3,600 km

Step 3: Divide your answer to Step 2 by your answer to Step 1 to get the image scale in kilometers per millimeter.

Answer: $3600 \text{ km} / 10 \text{ mm} = 360 \text{ km/mm}$

Once you know the image scale, you can measure the size of any feature in the image in units of millimeters. Then multiply it by the image scale from Step 3 to get the actual size of the feature in kilometers.

Question 1: What are the dimensions, in kilometers, of this image?

Answer: $160 \text{ mm} \times 119 \text{ mm} = 57,600 \text{ km} \times 19,000 \text{ km}$

Question 2: What is the width, in kilometers, of the largest feature in the atmosphere of Jupiter?

Answer: The width of the white equatorial band is 45 mm or 16,200 km

Question 3: What is the width, in kilometers, of the smallest feature in the atmosphere of Jupiter?

Answer: The faint cloud streaks are 0.5 mm wide or 180 km across.

Question 4: What is the size of the smallest feature on Io you can see?

Answer: The white spots in the southern hemisphere are 0.5 mm across or 180 km.

Question 5: Why do the surface details of Io look different from the details on Jupiter?

Answer: Because rocky/icy features have more rigidity than gaseous features and can create smaller features than clouds.